

a mirror for reflecting the object to be measured is disposed on the measuring stand,

wherein

the position detection means detects the position of the measuring head by a stereo method using two cameras;

the measuring head comprises

light irradiation means for irradiating the object to be measured with a light flux,

and

imaging means for imaging a measuring point on the object to be measured which is irradiated with the light flux from the light irradiation means, to pick up a real image of the object to be measured and a virtual image of the object to be measured which is reflected on the mirror;

the mirror has a light reflective surface formed on its surface; and

the operation means comprises

first means for finding the coordinates in a measuring head coordinate system of each of the measuring points on the basis of the coordinates of the measuring point on an imaging screen of the imaging means and an equation expressing a plane representing the light flux emitted from the light irradiation means,

second means for converting the coordinates of each of the measuring points which are found by the first means into coordinates in a world coordinate system on the basis of the results of the detection by the position detection means, to find a three-dimensional shape corresponding to the rear image of the object to be measured and a three-dimensional shape corresponding to the virtual image of the object to be

measured which is reflected on the mirror,

third means for finding an equation, in the world coordinate system, expressing a light reflective surface of the mirror,

fourth means for finding a three-dimensional shape which is symmetrical to the three-dimensional shape corresponding to the virtual image about the light reflective surface on the basis of the equation expressing the light reflective surface of the mirror, and

fifth means for synthesizing the three-dimensional shape which is symmetrical to the three-dimensional shape corresponding to the virtual image about the light reflective surface and the three-dimensional shape corresponding to the real image of the object to be measured, to find a three-dimensional shape of the object to be measured.

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contd.

27. (New) The shape measuring device according to claim 26, characterized in that

means for finding the equation expressing the light reflective surface of the mirror comprises

means for measuring the coordinates of three or more points on the light reflective surface by a stereo method using two cameras, and

means for finding an equation expressing the light reflective surface on the basis of the obtained coordinates of the three or more points on the light reflective surface.

28. (New) The shape measuring device according to claim 26, characterized in that

means for finding the equation expressing the light reflective surface of the mirror comprises

means for imaging an opaque thin plate using the measuring head in a state where the thin plate is placed on the light reflective surface, to extract coordinates in the measuring head coordinate system of three or more points for specifying a plane of the thin plate,

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cont.  
means for converting the obtained coordinates in the measuring head coordinate system of the three or more points into coordinates in the world coordinate system on the basis of the results of the detection by the position detection means, and

means for finding an equation, in the world coordinate system, expressing the plane of the thin plate on the basis of the obtained coordinates in the world coordinate system of the three or more points.

29. (New) The shape measuring device according to claim 26, characterized by comprising guide means for regulating the posture of the measuring head such that the light flux irradiated from the light irradiation means in the measuring head is perpendicularly emitted to the light reflective surface of the mirror.

30. (New) The shape measuring device according to claim 26, characterized in that the guide means regulates a moving path of the measuring head.

31. (New) The shape measuring device according to claim 30, characterized by comprising driving means for moving the measuring head along the guide means.

32. (New) The shape measuring device according to claim 31, characterized by comprising a case covering the whole of the moving path of the measuring head.

33. (New) The shape measuring device according to claim 32, wherein the case comprises an opening into and from which the object to be measured is to be inserted and extracted.

34. (New) The shape measuring device according to claim 33, characterized in that a cover composed of an elastic member is provided in the opening of the case, the cover comprising a notch into and from which the object to be measured is to be inserted and extracted.

35. (New) A shape measuring device comprising a measuring head for measuring the shape of an object to be measured which is placed on a measuring stand, position detection means for detecting the position of the measuring head, and operation means for finding a three-dimensional shape of the object to be measured on the basis of outputs of the measuring head and the position detection means, characterized in that

a mirror for reflecting the object to be measured is disposed on the measuring stand,

wherein

the position detection means detects the position of the measuring head by a

stereo method using two cameras;

the measuring head comprises

light irradiation means for irradiating the object to be measured with a light flux,  
and

imaging means for imaging a measuring point on the object to be measured  
which is irradiated with the light flux from the light irradiation means, to pick up a real  
image of the object to be measured and a virtual image of the object to be measured  
which is reflected on the mirror;

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contd.* the mirror comprises a light reflecting plate having a light reflective surface  
formed on its surface and a transparent plate formed on the light reflecting plate; and

the operation means comprises

first means for finding, with respect to a measuring point on the real image of the  
object to be measured, the coordinates in the measuring head coordinate system of the  
measuring point on the basis of the coordinates of the measuring point on the imaging  
screen of the imaging means and the equation expressing the plane representing the  
light flux emitted from the light irradiation means,

second means for finding, with respect to a measuring point on the virtual image  
of the object to be measured which is reflected on the mirror, the coordinates in the  
measuring head coordinate system of the measuring point on the basis of a coordinate  
value obtained by correcting the coordinate value of the measuring point on the imaging  
screen of the imaging means in consideration of the amount of refraction of the  
transparent plate in the mirror and an equation obtained by correcting the equation  
expressing the plane representing the light flux emitted from the light irradiation means

in consideration of the amount of refraction of the transparent plate in the mirror,

third means for converting the coordinates of each of the measuring points which are found by the first means and the second means into coordinates in the world coordinate system on the basis of the results of the detection by the position detection means, to find a three-dimensional shape corresponding to the real image of the object to the measured and a three-dimensional shape corresponding to the virtual image of the object to be measured which is reflected on the mirror,

fourth means for finding an equation, in the world coordinate system, expressing the light reflective surface of the mirror,

fifth means for finding a three-dimensional shape which is symmetrical to the three-dimensional shape corresponding to the virtual image about the light reflective surface on the basis of the equation expressing the light reflective surface of the mirror, and

sixth means for synthesizing the three-dimensional shape which is symmetrical to the three-dimensional shape corresponding to the virtual image about the light reflective surface and the three-dimensional shape corresponding to the real image of the object to be measured, to find a three-dimensional shape of the object to be measured.

36. (New) The shape measuring device according to claim 35, characterized in that

means for finding an equation expressing the light reflective surface of the mirror comprises